494/79

(12) UK Patent Application (19) GB (11) 2 204 510 (13) A

(43) Application published 16 Nov 1988

(21) Application No 8810065

(22) Date of filing 28 Apr 1988

(30) Priority data
(31) 8711007 (32) 9 May 1987 (33) GB

(71) Applicant
AE PLC

(Incorporated in United Kingdom)

Cawston House, Cawston, Rugby,
Warwickshire, CV22 7SV

(72) Inventor
Ronald James Purvey

(74) Agent and/or Address for Service
D J Goddard
Bowdon House, Ashburton Road West,
Trafford Park, Manchester, M17 1RA

(51) INT CL*
B04B 7/08

(52) Domestic classification (Edition E)
B2P 10C3B2
U1S 1364 B2P

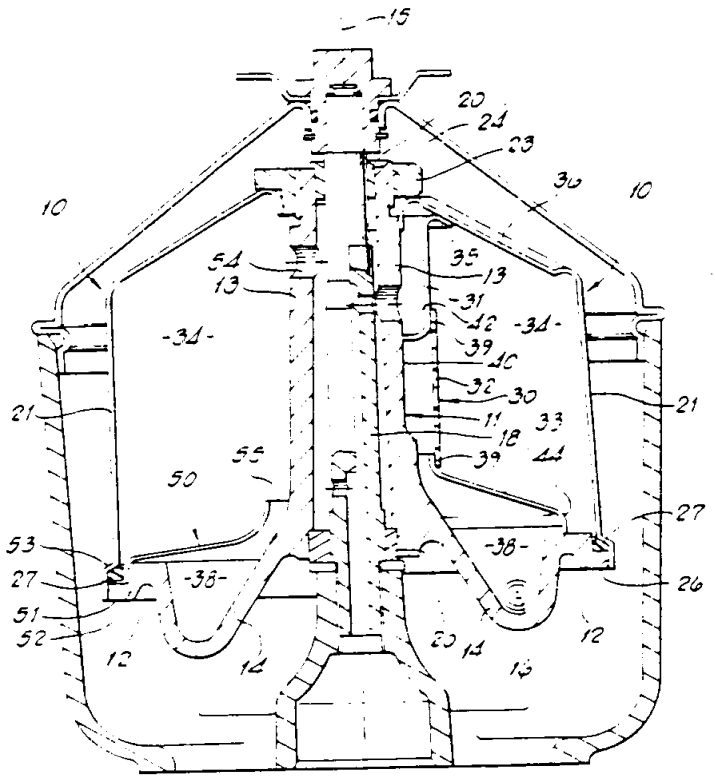
(56) Documents cited
GB 0757538 GB 0731312

(58) Field of search
B2P
Selected US specifications from IPC sub-class
B04B

(54) Centrifugal separator

(57) In a centrifugal separator having a disassemblable rotor (10) for cleaning lubricating oil, a clean oil fluid flow directing member (50) has an annular form and is removably located at its outer periphery (51) between a sealing member (27) and a base plate (12).

The rotor is supported by bearings (20) on a spindle (18). Oil to be cleaned enters the rotor via ports (54) and cleaned oil is directed by the member (50) to enter chambers (38) via annular entry (55). This oil is then expelled into the space in a surrounding casing e.g. via nozzles (16), so driving the rotor (10) by reaction.

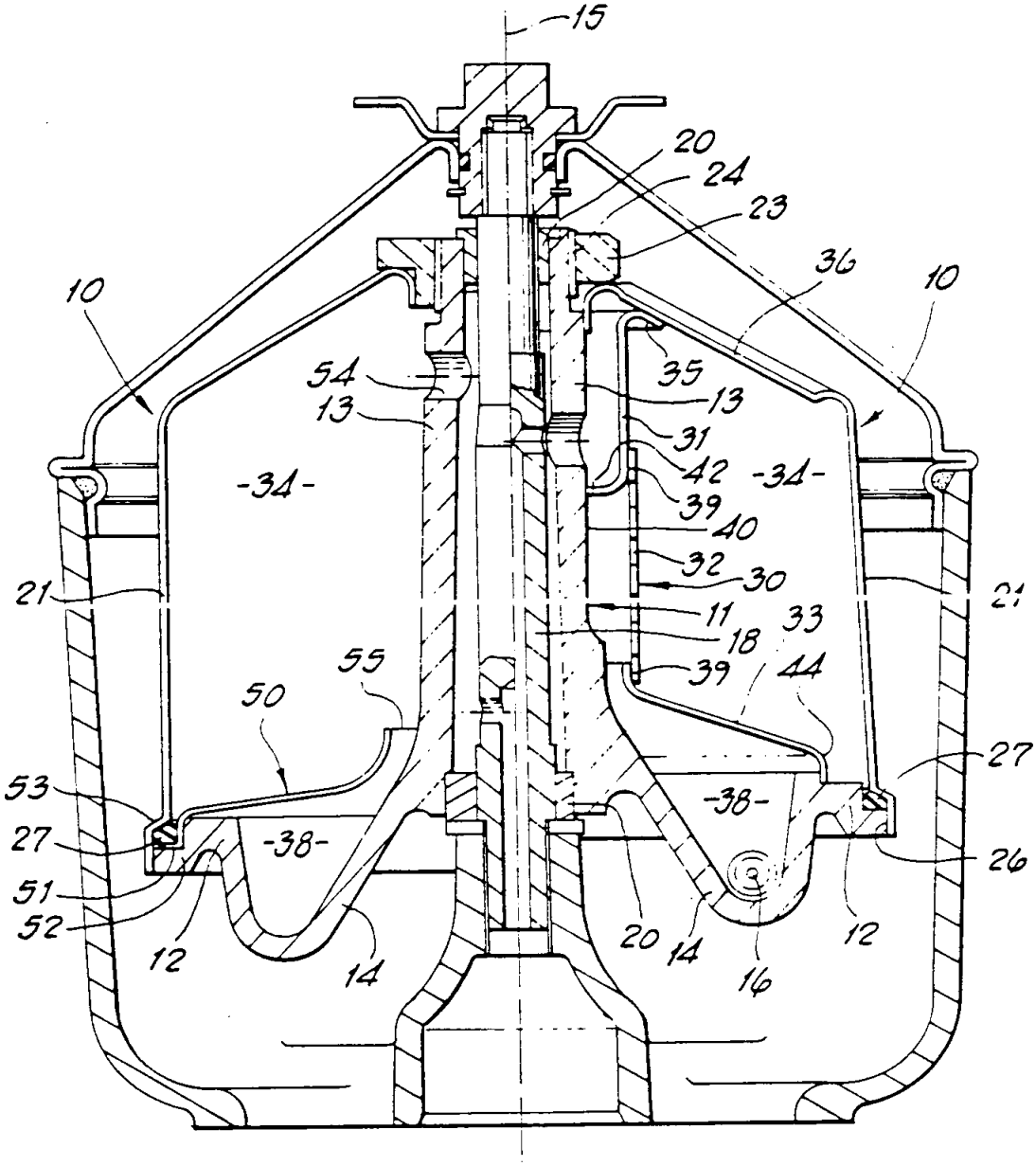


GB 2 204 510 A

C

2204510

1/1


15
20
24
23
36
10
10
54
13
13
35
31
42
39
40
32
30
11
18
39
33
44
55
50
53
27
51
52
12
14
20
14
16
12
26
27
21
21
-34-
-34-
-38-
-38-

Improvements in or relating to Centrifugal Filters

The present invention relates to centrifugal filters and particularly, though not exclusively, to oil filters for engines and transmissions.

Centrifugal filters for removing impurities and contaminants from oil are well known. Those operating on the oil pressure of an engine to drive the cleaning rotor by reaction from issuing oil jets are also well known.

It is necessary to direct the oil flow within the rotor in order to achieve separation of the contaminants. Usually the oil flow is outwardly to the outer wall of the rotor and is then forced inwardly by the oil pressure towards the axis of the rotor before entering a chamber in which the driving nozzles are located. The rotor is thus permanently full of oil and maintained so by the oil pressure when the engine, for example, is running.

In rotors which are disassemblable for cleaning the oil flow directing member is generally a relatively expensive fabricated construction.

It has now been found that oil flow may be directed within the rotor in a much simpler and less expensive manner and also afford greater contaminant capacity.

According to a first aspect of the present invention there is provided a fluid flow directing member within a disassemblable rotatable cleaning rotor of a centrifugal filter, the member comprising an annular form and which member is removably located by its outer periphery by a sealing member and a base member.

It has been found in one embodiment of the present invention that the fluid flow directing member is particularly effective in rotors having driving nozzles located in relatively high volume, low turbulence troughs which lie below the flow directing member.

According to a second aspect of the present invention there is provided a centrifugal filter comprising an oil flow directing member according to the first aspect.

A very significant advantage conferred by the construction of a filter according to the present invention is the fact that the outer periphery of the flow directing member is sealed against oil flow in the wrong direction. It has been found on some prior art filters that the fabricated construction, if not completely accurate in assembly, sometimes allow soil, for example, to escape between the flow directing member and the base member directly into the nozzle chamber. The effect of this is that uneven dirt build-up in the rotor is promoted thus causing the rotor to become unbalanced which results in vibration which slows the rotor. Such slowing of the rotor reduces the cleaning efficiency which is dependant on rotational velocity.

In order that the present invention may be more fully understood an example will now be described with reference to the accompanying drawing which shows a section in elevation split about the axis and showing a centrifugal filter according to the present invention on the left-hand side and a prior art filter on the right-hand side of the axis.

Referring now to the prior art filter on the right-hand side of the drawing and where the rotor is shown generally at 10. The rotor includes a casting 11 having

an integrally formed base plate 12 and standpipe 13. The base plate includes two troughs 14, each symmetrically disposed about an axis 15. The troughs 14 extend through about 180° each and gradually deepen from 0° to their maximum depth at about 180° in a smooth contour. Each trough has a nozzle 16 lying in an end wall where the troughs end at their maximum depth. The rotor casting 11 is supported on a spindle 18 by two bearings 20. The rotor 10 is closed by a domed top cover 21 which is secured by a nut 23 on a threaded portion 24 of the standpipe 13. The joint 26 at the lower extremity of the cover 21 is sealed by a "O" ring 27. The oil flow directing member 30 is a fabrication comprising three individual pieces; an upper cup-like member 31, a perforated screen 32 and a lower annular member 33. The member 31 serves to direct oil in an upwardly direction and into the rotor chamber 34 via grooves formed between a lip 35 of the cup member and stiffening depressions 36 in the domed cover member 21. The chamber 34 is filled with oil and which is forced through the screen 32 into the chamber 38 formed between the troughs 14 and the lower annular member 33. Oil is expelled from the nozzles 16 in a jet to drive the rotor by reaction. The member 30 is formed as a unit by spot welds 39 securing together the members 31,32 and 33. The casting 11 requires machining on the outer surface 40 of the pipe 13 to form a close fit with lower

inturned portion 42 of the member 31 and also on a flange 44 which co-operates with the outer periphery of the annular member 33.

Referring now to the left-hand side of the drawing and where similar features are denoted by common reference numerals. The oil flow directing member comprises only a single sheet metal annular pressing 50 having a flanged portion 51 at its outer periphery. The member 50 is held in position by means of the "O" ring seal 27 which both holds the member 50 down by the flange 51 so that it is accurately located over the flange 52 of the base plate 12 and also forms a flow of oil between the flanges 51 and 52 into the chamber 38. The oil seal 27 is compressed by the lower extremity 53 of the cover member 21. Oil issued directly into the chamber 34 is filled with oil and is directed into the chamber 38 formed between the member 50 and the trough 14 via the annulus 55 formed between the inner periphery of the member 50 and the standpipe 13. No additional machining of the casting 11 is necessitated by the flow directing member of the present invention and thus manufacturing costs are further reduced.

An additional advantage of the invention is that less volume within the rotor is taken up by the oil flow directing member according to the invention, thus

greater contaminant capacity and, therefore, longer life is provided.

The invention has been described with regard to a rotor having nozzles located in smoothly contoured troughs and which type of construction affords an improved performance in terms of increased rotational velocity for any given oil pressure by virtue of the reduced oil turbulence in the region of the nozzle. Such a construction is fully described with reference to disposable rotors in published European patent application No. 0193000 of common ownership herewith. Known nozzles of the type which are in the form of pips or other protuberances which extend from the rotor base may alternatively be used.

CLAIMS

1. A flow member within a disassemblable rotatable cleaning rotor of a centrifugal filter, the member comprising an annular form and which member is removably located by its outer periphery by a sealing member and a base member.

2. A flow directing member according to Claim 1 comprising a steel sheet pressing.

3. A centrifugal filter having a flow directing member which is removably located in the cleaning rotor by the outer periphery of the member by a sealing member and a base member.

4. A centrifugal filter according to Claim 3 wherein the flow directing member is a sheet steel pressing.

5. A centrifugal filter according to Claim 3 or Claim 4 wherein the rotor has driving nozzles lying in two relatively high volume troughs which each extend through approximately 180° of the base member and which troughs begin with minimum depth at 0° and finish with maximum depth at or near 180°.

6. A flow directing member substantially as hereinbefore described with reference to the accompanying description and the left-hand half of the drawing.

7. A centrifugal filter substantially as hereinbefore described with reference to the accompanying description and the left-hand half of the drawing.